EDUCATIONAL ASSESSMENT OF STUDENTS IN PRIMARY SCHOOL IN TUNISIA

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ABSTRACT

Regardless of the study level, the assessments applied in the different educational institutions in Tunisia raise many questions. Do these practices indicate the learners' cognitive metamorphoses? Do formative and summative evaluations intend to access knowledge acquisition at the expense of understanding? Is the content of the evaluation approaches and instruments an important part of the learners' previous knowledge? Is there any relationship between this content and the specific knowledge base of the learner? Does the evaluation instruments structure provide access to knowledge construction? Is this structure oriented towards the evaluation of low-level cognitive skills more than to the assessment of high-level cognitive skills? Does the assessment context introduce affective variables that may influence learners' results in a negative way? Do the used instruments allow consistently determining the learners' strengths and weaknesses? Do the correction criteria respect all the learner's responses worth to build up a special knowledge? Do objectivity requirements influence these criteria more than the cognitive value of responses? In fact, all of these questions risen show the seriousness and complexity of the evaluation problem in the school environment as well as the cognitive progress of the learners. They are quite related to the subject matter of the evaluation instruments and their structure as well as their objectives and the background they are taking place in than to the correction criteria. In this paper, we propose a personalized evaluation environment for mobile learning. We first introduce m-evaluation scenario. Then, we describe this personalization as well as the architecture of the evaluation environment composed of Web services and based on communication between these services carried out via Semantic web technologies. The environment presented allows assessing the learners' knowledge of a particular teaching content by first of all searching, then selecting and finally generating a test well adapted to their knowledge level. In fact, a new course will be introduced once the evaluation is accomplished. We also managed an experimentation based on concluding the student's satisfaction degree.

1. INTRODUCTION

The evolution in the Information and communication technologies has considerably modified the organizational structures of learning and its processing through the last decade mainly because of the increase in using the Internet as well as network technologies. Consequently, there is general use of movable communication means as mobile phones and laptops that can be connected to the internet through the different wireless networks (Wi-Fi, 3G, etc.) The use of these mobile tools revolutionizes the pupils' view of space and time in the learning context. These technologies contribute the young learners with significant competences to the extent of carrying out their scholarly scheme conceivably ever. Hence, mobile technologies are valuable for pupils. Actually, they better develop their collaborative, communicative, and coordinative skills. They also promote cooperating with teachers and grant outstanding autonomy as well as improving responsiveness.

Studying many criteria in such learning approach including learner mobility, learner profile, organization of knowledge, learning time and gain and so on increases the efficiency of m-evaluation. Indeed, mobility in m-evaluation is notably detected in the context concept which indicates the learners' suitable situation. It is crucial to determine, with reference to the context, which resources to send, how to send, when to send, on which interface, etc. Therefore, the entire evaluation process must be adaptable to these developing contexts.

With the evolution of Web 3.0, the semantic web sounds to ensure technology to carry out m-evaluation system. Undoubtedly, the semantic Web is a Web intelligible to both men and machines. Thus, it represents a vast field of applying works emerging from the knowledge formality and representation reasoning (Berners-Lee et al., 2001).

In this manuscript, we suggest a flexible environment for mobile evaluation using semantic Web technologies for description and reasoning. This paper is structured as follows: First, we present related works. Then, we introduce our work based on a mobile evaluation (m-evaluation) scenario in an open learning network. Afterwards, we analyze the proposed scenario and we describe the m-evaluation process. The architecture set up for the evaluation system is depicted in section 5. In section 6, we discuss the first uses of this system and we end the paper with a conclusion and our future works.

2. RELATED WORK

Plenty of studies about using mobile technologies have been performed in mobile environments assessment. As an example, Cheniti and al. realize a Mobile and Personalized Evaluation System (MPES) using the Semantic Web and Web services. Actually, MPES connects and realizes a set of web services interacting together to provide the system needs. This approach is likewise effective to handle the semantic web technology. Web services, naturally, set up the evaluation resources corresponding to the set of the different attitudes, the learners' needs and how they collaborate with the mobile environment (Belcadhi et al., 2013). Similarly (Coulombe et al., 2011) proposed the MobileQuizz project performing a multiplatform mobile application executed with the Google Web Toolkit in Ajax. Likewise, the Context aware adaptive and personalized mobile learning systems is introduced by (Sampson et al., 2013).

The approach of Chen (Chen, C. H. 2010) is based on self-assessment research results and peer review in which he realized a Mobile Assessment Participation System (MAPS) used by PDA (Personal Digital Assistant). Moreover, Chen recommended a model of MAPS implementation simplifying and improving self-efficiency and peer assessments in classrooms. However, in (Coulby et al., 2011) and with reference to a group of students in their last year of medicine, the authors analyzed the effect of contributing a skill-based assessment via PDAs. This assessment presented the good experience of using mobile technologies to evaluate the students' level.

In the same way, Zualkernanand et al. performed an architecture that takes a QTIv2.1 evaluation test based on an XML file and systematically generates a Flash Lite to be presented and then executed on a mobile device (Zualkernan et al., 2007).

3. A MOBILE EVALUATION SCENARIO OF A LEARNER

In this section, we describe the context of our research using the following evaluation scenario: Idriss, a 7th year Basic student, would like to prepare for his exam on the Arabic grammar course. This student wants to review the nominal sentence components lesson. He also wants to evaluate his knowledge. So, he starts by selecting this lesson. The necessary prerequisites for the chosen lesson will be first researched .The corresponding questions will be, then, presented to the student. These questions form a pre-assessment on the chosen lesson. The student will, as a result, have the opportunity to revise the lesson parts that are not known and for which the corresponding questions were not answered in the correct way.

Finally, to insure that Idriss understands the essential notions of the formerly-mentioned lesson, questions will be searched and presented to form a personalized post-assessment test. The learning environment must show Idriss's process in revising the selected lesson. The tests presented to Idriss should contribute a detailed and precise assessment of his knowledge and level of understanding. Thus, all the main parts of the course must be well understood. Whenever Idriss chooses a lesson to revise, the learning environment should look for relevant assessment supports, especially the questions that should be put after the examination of the final tests, the learner's options in terms of language and learning plan parameters. Idriss wants to access the resources of this evaluation from a mobile interface. Served by a personal PDA, the student can, for instance, be in the school library for an hour. Idriss will, accordingly, access a user interface where he can choose the course to be evaluated as illustrated in figure 1. Then, he enters a set of keywords showing the theme of the

evaluation. Idriss should also specify his location type. Moreover, he must specify the maximum time reserved for the self-evaluation test: 1 hour. Finally, he gives his preferences in terms of the questions types. For example, he chooses the SOAQs (Short and Open Answer Questions).

Figure 1. Learner interface

All the information indicated by Idriss must be taken into account when generating the assessment test. The evaluation environment presents itself as a context-sensitive system for the generation of personalized and mobile evaluation tests. It must also score and safeguard its progress and evaluation references in order to use them in future evaluation activities. Assessment tests, presented to the students, should be adapted to their profiles, level and prerequisites.

The environment should, thus, personalize the learning and evaluation content to the learner's level of knowledge based on two main concepts:

- Reuse and Interoperability through the design and implementation of the content in the form of learning objects: allows a dynamic generation of the content by identifying and searching teaching or evaluation resources to be regenerated. Through this design, the course will not be conceived in a monolithic way, but as a set of independent parts. These objects represent also the new approaches and reflections basis on the possibilities of electronic learning systems standardization.

- Estimation of the learner's level of knowledge at each learning stage through a personalized evaluation.

Four functionalities must then be determined in such evaluation system:

- Content presentation to the learner.
- Knowledge assessment obtained by the learner.
- A suitable content generation adapted to the assessment of the learner's knowledge.
- Consideration of the learner context and the personalization of the evaluation according to the parameters provided by the evaluation context.

4. A STUDY OF THE PROPOSED SCENARIO

Mobile learning environments are distinguished by unreliable learning situations and circumstances. In such environments, context modeling is needed to better understand the learners' activities and to personalize the learning resources. Context-sensitive environments generally refer to a class of environments that can capture environmental parameters and adapt accordingly the set of decisions and behaviors. They are essentially characterized by their heterogeneous nature involving steady change of context according to many circumstances depending mainly on the learner, location, time, place, etc. The basic goal of learning is always to yield the learner with context-relevant learning and / or evaluation resources. Thus, the learning or assessment process must be adjusted as well as adapted to the context. Contextual reasoning is an important aspect in studying the ambient intelligence. Its aiming is to figure out new knowledge based on the accessible data. It makes context-sensitive applications more intelligent and personalized according to the users 'needs. Thus, context sensitivity results from the dynamic and heterogeneous nature of the ambient environments.

In order to maintain contextual reasoning and supply the learner with a Mobile Assessment Object (MAO), First Order Logic (FOL) should be used. Indeed, FOL is a very influential and potent means of reasoning about the context in a mobile environment. The set of Framework information serves as first-order predicates. In fact, this description is very eloquent and can be used to show the various types of information.

We present personalized evaluation formalism with FOL developed from the formalism of hyper-media adaptive educational systems (Baccari et al., 2016). The choice of the predicates logic for this formal description is stimulated by the fact that this type of FOL gives a specific design of the data representations. The evaluation personalization, in a mobile environment, is influenced by a set of parameters that establish our framework. Indeed, the Mobile Assessment Framework (MAF) must be described according to a set of information combined in a group of ontological models, and the learner's interactions with the Framework must be treated in order to update the learner model and apply it in any evaluation task. The Framework must include, similarly, a personalization element allowing personalizing the assessment activity in accordance with a set of information.

5. DESIGN OF CONTEXT-SENSITIVE MOBILE EVALUATION SYSTEM

The Mobile learning environments are identified by unreliable learning conditions and circumstances. In such environments, context modeling is needed to perceive well the learners' activities and to personalize the learning resources. However, context-sensitive environments mainly indicate a class of environments that can pick up environmental parameters and accommodate the set of decisions and behaviors appropriately. They are basically characterized by their heterogeneous nature involving a steady change of context according to many circumstances mainly relying on the learner, location, time, place, etc. The fundamental objective is to ever provide the learner with context-appropriate evaluation means. The evaluation process has to be therefore diversified and of course relevant to the context.

Hence, we suggest, in this paper, the Context-Aware Mobile Assessment System based on semantic web. This architecture describes a powerful valuable approach to exploit the technology of the semantic web. Web services develop assessment resources conforming a set of ontologies, the learners' needs and how they interact to the mobile environment.

The different exchanged documents are of RDF type. As a result, in order to admit a personalized evaluation support, metadata about the field of application (courses), assessment resources (questions), learners (prerequisites and skills), context, and evaluation history are crucial. The system uses the DC standard, a group of ontologies and specifications, to promote interoperability. It is also planned to submit the IMS / QTI specification to ensure the exchange of evaluation resources. The architecture of the system is illustrated in figure 2.
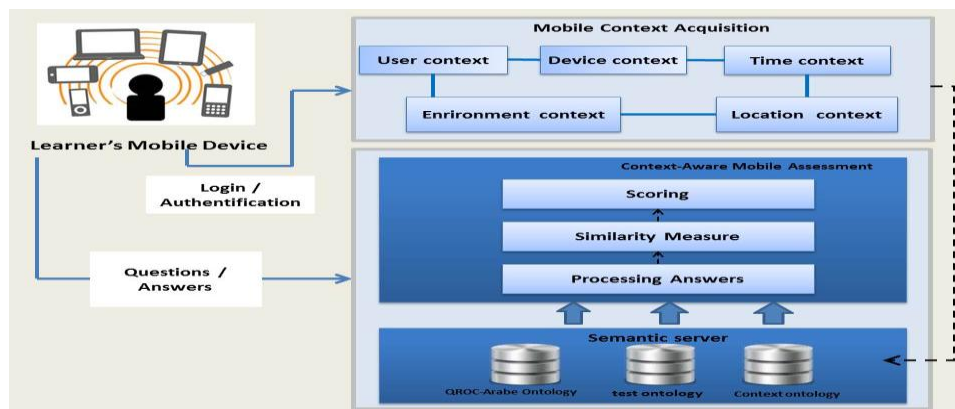

Figure 2. Aarchitecture of personalized m-evaluation system

Our system is definitely based on five modules:

1- Authentication module: consists in identifying the learner in his/her mobile environment. It is established by parameters which will be later communicated to the local database.

2- Context management module: This process is composed of three main levels:

▪ Acquisition: The acquisition of the environment contextual information is made by modules that directly capture information from the environment through probes, devices, means of interaction, etc.

▪ Aggregation and storage: The captured data are significant and coherent and interpreted for a specific use. This contextual information will be stocked for later use and accessible for processing.

▪ Processing: Context information processing consists in selecting resources from the user's request and applying an adaptation method to elaborate the selected resources. Contextual information and relevant resources are sent at the application level. The use of context information at this level consists in presenting this information to the user to interact, to notify him/her about the changes or to trigger the system event or action, etc.

3- Ontologies database: includes the ontologies that can be applied to model the context of the learner by indicating the user context, device context, location context and acquisition context). It also involves the ontologies of the learner response and those of the teacher (Khalifa, W. B et al., 2016).

4- Evaluation module: It rectifies the answers and then calculates the result of the learner according to his answers which will be segmented into words after performing the partial decomposition to compare them with the model answers already available for the score computing according to the similarity measure of Wu & Palmer in order to obtain the final results. Then, this module sends these results to the Interface agent which passes them to the tutor agent that displays the results to the learner. It performs this task after receiving it from the adapted test list and corrects this list by the adaptation Engine agent that prepares tests adapted to the learner's level. Finally, it saves the learner's result in his/her profile.

5- Test database and SOAQs-Arabic: It contains all the tests provided for each course and the test results for each learner. The tests are of SOAQs (Short and Open Answer Questions) type, which allows a semi-automatic correction. Indeed, each test has a defined deadline.

6. DISCUSSION

We suggested a mobile evaluation system that compels taking into consideration the context and its elements. Indeed, both of the context concepts and context sensitivity are two key terms broadly used to exploit mobile environments. In order to maintain a mobile evaluation, we need to model the context. In our work, we chose to use the ontology-based approach not only to model the context, but also to think about the described data. This approach is combined with the logic-based one allowing the deduction of a set of facts and new inferences. Besides, we introduced a mobile assessment situation as a set of evaluation context information characterized by a specific time period which can change the evaluation system behavior. As far as the evaluation objects are concerned, it is necessary to define a mobile evaluation object which considers the use of these resources in mobile environments.

To verify the system efficiency and test the aspect of personalization and adaptation, mobile evaluation system should be designed. In this work, we performed our experiments on 7th year Tunisian pupils at Bouficha High School. The aim of our study is to assess the satisfaction and the results of pupils by testing the system on different devices, such as mobile phone, touch pad, PC, employing the system at various time in order to evaluate pupils' prerequisites, and changing their locations.

The evaluation process was carried out on 30 pupils who were classified into two groups based on their Arabic grammar prerequisite: beginners and intermediate-level pupils who were given a system performance evaluation form containing 16 questions relying on 4 assumptions:

— A: Hypothesis 1: personalization aspect assessment contains 4 questions to test both the portfolio and the level of the pupils
— B: Hypothesis 2: adaptation aspect assessment contains the same number of questions as the personalization aspect assessment.
— C: Hypothesis 3: usability assessment includes also 4 questions. Students are invited to improve their opinions in terms of: navigation, generic use, etc.
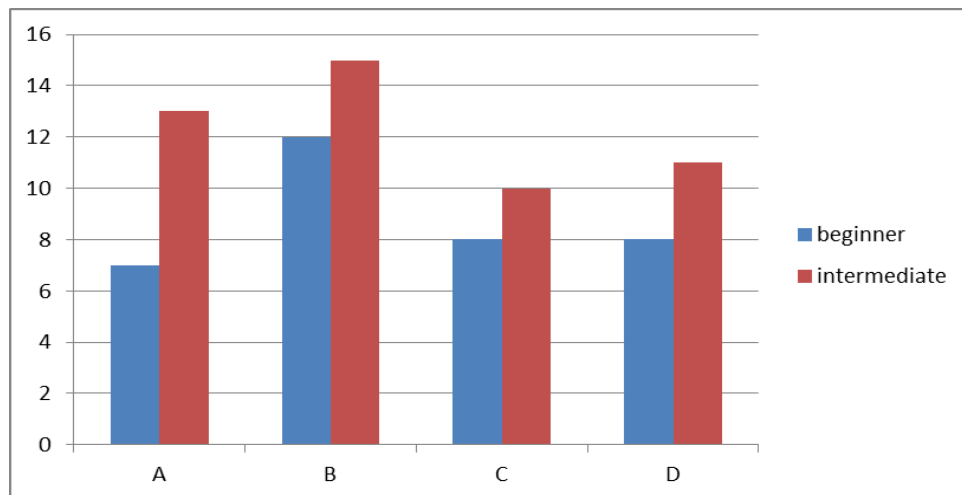— D: Hypothesis 4: system guidance and improvement evaluation

Figure 3. Histogram representing answered questions according to pupils' levels

Figure 3 represents the histogram of the answered questions based the pupils' level.

From this figure, we notice that the majority of intermediate-level pupils perceived the criteria of personalization. However, beginners did not properly recognize it. In fact, to better enhance the personalization aspect, pupils had to utilize the system several times and accurately answer some given questions. B analysis shows that the phase of adaptation was praised by the two afore-mentioned groups of pupils. Indeed, changing the device used or the location type leads to the generation of different tests.

As shown in D and C, we notice that it was confusing for beginners to use the system mainly because of the Arabic complex Grammar courses content. Furthermore, most of them liked to utilize large- screen device system because they were generally familiar with employing small-screen devices for entertainment.

Besides, pupils found that using such system is efficient in mobile learning and self-assessment. They proposed that applying this system will be expanded in other courses. The obtained findings are promising. They prove the possibility of employing this system by a wide range of pupils if the tool is introduced in various knowledge domains.

The choices of the parameters used in the discussion are marked by an open mind rather than partisan. They are guided not by a methodological blindness but by an intention to derive a rich, interesting, and original understanding of the object of study.

7. CONCLUSION AND PERSPECTIVES

We introduced, in this paper, a personalized evaluation system using the semantic web services allowing the selection and presentation of learning and evaluation resources adapted to the learner's level of knowledge. We presented also a formal description of the m-evaluation, based on FOL, and discussed its main elements to be considered when dealing with the mobile version. Moreover, we fully described the framework and recommended Logical rules based on first order logic. All these rules and other ones will be used later to personalize the assessment in a mobile learning environment and to adapt it to the assessment activity context. The architecture of the system was also well developed.

The evaluation system, in its mobile version, was tested on a group of young learners. The next step consists in developing mobile components for other types of questions and to test them on a group of learners, which will certainly boost the personalization functionalities provided to learners.

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